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# Conserving Heritage Tiles on the London Underground: Challenges and Approaches

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The London Underground is the oldest Underground railway in the world. Some of its stations are now over a century old, and many others have important historical associations. A great number of the early stations were tiled in distinctive schemes, leaving London Underground with an enormous amount of tiling heritage to care for in a transport network that has to continue offering a customer focussed service on a daily basis. This paper discusses the difficulties this presents to London Underground in its efforts to conserve its heritage tiling, and the approaches they have taken. Both London Underground's and the heritage community's attitudes to large scale architectural conservation have changed over time, so from an initial approach of retention of all viable original material, they have moved on to a more considered aim of holistic station conservation, focusing on the architect's intent and the "feel" of a station. It is not only London Underground who have been involved in the work affecting heritage tiling, and the impact of other parties is also discussed.

## Introduction

The London Underground has a long and complex history, stretching back to the middle of the 19th century. Many stations still retain elements of their historic pasts, in the form of decorative and functional features, which are defined by London Underground as "Railway Heritage Features" (LUL 2006a, 48). Such features include clocks, benches, signage, and ceramic glazed tiles. They are considered to have intrinsic value because they "have a place in the history and development of either railways in general or that of the London Underground in particular" (LUL 2006a, 48).

The heritage tiling on the London Underground is ubiquitous and highly visible, as well as being highly variable in colour, date and the size of tiles, and it thus presents myriad difficulties for conservation. This article covers only ceramic glazed tiles used on walls inside stations, mainly in underground passages (there being very little that survives above ground). On a station platform with tiled walls, many difficulties may arise in attempting to preserve all of the tiling over a long time period. Wiring and signage requirements change, vandals cause damage, tiles age and deteriorate. This is particularly problematic in an environment that the "visitor" does not associate with heritage, and that is not presented as a heritage destination.

The questions that arise concerning the conservation of heritage tiling by London Underground include the way in which they deal with the difficulties presented by the unique environment of the Tube (a widely used nickname for the Underground, Bruce & Croome 2006, 8-9), the meaning of conservation in a non-heritage focussed environ-

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ment, the possible approaches that are thus available to them, and the extent to which these can be executed.

I conducted research in three ways: desk research, interviews and site visits. Interviews with people involved with tiling projects on the London Underground formed the main part of the research presented here. Interviews were conducted with:

- Mike Ashworth, the Design and Heritage Manager at London Underground;
- Adrian Blundell, Works Director at Craven Dunhill Jackfield who make a large number of the replacement tiles for London Underground;
- David McCartney, a Managing Director at DMC Rail who do a large amount of the modern tiling work within the stations including retiling with replacement heritage tiles.

In addition I interviewed local authority conservation officers from Westminster (Matthew Pendleton) and Kensington & Chelsea (Hilary Bell) about their view of the approaches that have been taken.

Other people I spoke to were tangentially connected with tiling or the London Underground: Robert Excell, a curator at the London Transport Museum who showed me around their Acton depot; Doug Rose, the author of *Tiles of the Unexpected* (2007), an exhaustive survey of tiling on the Yerkes tube lines which took 25 years to complete (D. Rose, *pers. comm.*, June 2010); and Jeremy Southern, an independent tile conservator based in Shropshire.

Site visits were undertaken to all stations mentioned in this project, and many more besides. Initial visits lasted about 20 minutes per station, time which was spent walking up and down the platforms and lower concourses and passageways closely observing the tiles, and taking photographs, which is permitted on the platforms if no flash is used (London Underground Film Office, *pers. comm.*, 25/06/10). All photographs were taken in the summer of 2010. Stations mentioned here in detail were visited on more than one occasion. Station names have been used as they are shown on the standard tube map (TfL 2010a).

## Social and Historic Importance of London Underground Tiles

Given the impact of the London Underground on the growth and socio-economics of London since it opened in 1863, it should be considered an important part of the social and built history of the city (Halliday 2004; Wolmar 2005). As such, the historical elements of the network should be thought of as London's heritage in the same way as other parts of London's built environment such as Big Ben or St Pancras. The presentation of the underground spaces, including the tiling schemes through the network, is an integral part of the network's histories, forming a strong image of London Underground in what might otherwise be a dark, forbidding place.

During certain periods of the 20th century, the design of the public front of the London Underground was controlled by people with a set of clear architectural visions for the network. These ideas were applied to distinct phalanxes of stations, lending each group a certain "look" and "feel" (what might now be termed a corporate identity), while at the same time ensuring that each station remained unique; indeed, this was the stated aim of the architects from the outset (Rose 2007, 22). The men credited with achieving this are Leslie Green, working with and for Charles Tyson Yerkes, and Charles Holden with Frank Pick (Leboff 2002; Rose 2007; Lawrence 2008; LUL 2006a, 17, 24, 69).

Tiling was used to help form a corporate image, creating a continuity through the network that encouraged recognition of London Underground property and articulated the orderliness of the network to the general public. These same principles are still of great import today. London Underground's corporate vision is to be "a world-class Tube for a world-class city" (LUL 2006a, 2). An impor-


**Fig. 1:** Examples of London Underground stations designed by architect Charles Holden. From top: Chiswick Park (photographed by Topical Press 12 Oct 1932, LTM U11500); Turnpike Lane (photographed by Topical Press Jan 1933 - Mar 1933, LTM U11887); Arnos Grove (unknown photographer 1932, LTM unknown image number).

tant part of achieving this goal is to ensure that the station environments are of a high quality, safe, secure, and welcoming (LUL 2006a, 2). Pick's stations are an early example of total design; everything within them was thought through and designed into the fabric of the station, from benches to door handles (Lawrence 2008, 7), and it was Pick who commissioned the London Underground typeface 'Johnston Sans' still seen across the network from Edward Johnston in 1916 (Howes 2000). As it was for Frank Pick, so it is for today's company leaders: they wish to communicate the values of London Underground through its visual representation to the public, who should take from the stations an impression that the organisation is customer driven, having clear "humanity", with strong leadership and is operationally integrated (LUL 2006a, 2). Some of the ways in which stations can contribute to this are by "the commonality of the design", "their high-profile street presence" (LUL 2006a, 3) and "their celebration of the Underground's heritage and design excellence" (LUL 2006a, 4).

Therefore the tiling on the London Underground can be thought of as important for three main reasons: its contribution to the history of the Underground and thus of London, its role as corporate representative, and its part in aesthetically improving underground areas of the network for passengers. Whether these roles conflict, and to what extent, is investigated further below.

The Yerkes stations of 1906/7 are one group of Underground tiled stations dealt with in this research, consisting of forty-six stations across the Bakerloo, Hampstead (Northern Line) and Piccadilly Lines (Rose 2007, xi). The second type of station considered in this study are those designed by or in the style of Holden under Pick, modernist statement pieces dating from the early 1920s to the end of the 1940s (Figure 1).

In 1998 the government announced a large scale private finance initiative (PFI) across the whole Underground network, branding it as the PPP, public-private partnership, forming three infrastructure units ("infracos") that used private capital and were responsible for the maintenance and

renewal of London Underground's assets – rolling stock (trains), stations, tracks, tunnels and signals – for thirty years (Halliday 2004, 200; TfL 2010b). These would be overseen by a public operator, London Underground, which was placed under the control of the newly formed Transport for London in 2003 (Horne 2007, 133; TfL 2010b; Wolmar 2005, 309-310). The infracos at the beginning of the PPP contract period were JNP/ Tubelines and Metronet (TfL 2010b). Metronet went into administration in 2008, and the Metronet infracos are now under Transport for London ownership (LUL 2009, 8). As of June 2010 JNP/Tubelines became a wholly owned subsidiary of Transport for London, leaving no infracos in place, and bringing to an end the PPP contracts (TfL 2010c). However, the approaches to tile conservation discussed in this document are in the context of the PPP scheme.

## Conservation Context

The twentieth century saw the establishment of conservation charters, whose aim was to create consistent multinational guidelines (Whitbourn 2007, 123). The basis of most of the charters is formed from the following factors: minimum intervention, detailed documentation, importance of material from all historical periods, authenticity (see below), and consideration of an overall context (Gillon 1996, 21). These principles have been adopted by the conservation profession, along with reversibility (Caple 2000, 59-69; Pye 2001, 32-33). In recent decades, discussions on the role of conservation have led to the development of a generally agreed list of values that an object or site may have, and that conservation might affect, including: historical, economic, scientific, socio-cultural, aesthetic, and use value (Mason 2002). Recent literature gives greater significance to the cultural ownership of objects and monuments than was previously the norm, when the museum elite presumed intellectual and physical possession (Bennett 1995; Caple 2000, 66; Simpson 2006).

Current conservation ethics for heritage buildings are phrased similarly as for objects: minimum intervention, reversibility, authenticity, documentation (Fielden 2003, vii; Forsyth 2007, 6-7). Additionally, there is a preference for "like for like" repairs, using materials and techniques as close to the originals as possible (Forsyth 2007), and the aim to achieve restorations that blend with the fabric of the building so as to present a congruous whole. Building conservation literature stresses the importance of authenticity (Robertson 2007; Macdonald 1996; Saint 1996). Jokilehto of ICCROM and Stoval of ICOMOS have defined authenticity as "a measure of truthfulness of the internal unity of the creative process and the physical realisation of the work, and the effects of its passage through time" (1995 quoted in Macdonald 1996, 90), that is, the recognition of the importance of the original materials chosen, of the artist/architect's vision, of the final aesthetic, and the history of the building (Macdonald 1996, 90). Andrew Saint (1996, 20) agrees that "an authentic restoration, it may be ventured, is not just one in which all the parts, visible or otherwise, are repaired or replaced on a like-for-like basis, but one also in which the original priorities of the building's authors (all the building's authors) are critically heeded". Tiles that form part of a building's functional architecture or make up a large part of its decorative aspects are considered to be part of that building, with the exception of highly decorative individual tiles or set pieces, or very old examples, which might be treated separately (Durbin 2005, xix-xxi; Herbert 1996). Thus the concept of "like for like" also applies to tile conservation (Durbin 2005, 55; Orbaşli 2008, 166).

## Challenges

London Underground own and manage 260 stations (TfL 2010c), which is a large amount of property to maintain. The scale of the task of maintaining all the tiling across the network is daunting, although not all of the stations are tiled. Over a thousand million pas-

sengers are carried on the Tube each year (TfL 2009, 10), and at busy stations over 50,000 passengers can pass through in the morning peak hours (TfL 2010c). The volume of people using the system inevitably results in a fair amount of wear and tear to all the fittings with which people come into contact. Some of the original tiling in the Yerkes stations will have been subjected to this onslaught for over a hundred years.

The difficulties presented by the specific local environment of the Underground are various and include the vast size of the tiled areas across the network, vibrations caused by rolling stock, and also the problems caused by being underground, such as damp. The fact that the tiles are located within a transport network mean that heritage is not the first priority, and factors such as time restraints and behaviour of customers are very different from those encountered in more traditional heritage locations (Bennett 1995). There are also issues raised by health and safety, the conflicting aims of interested parties, and the aims of London Underground in terms of the presentation of their assets.

## Approaches

From the day that tiling on Underground stations is fixed to the walls, it is subject to risk of change. Six Yerkes station platforms had been retiled as early as 1935 (Rose 2007, 28), due to the installation of escalators causing major disruptions to the original platform design (D. Rose, *pers. comm.*, July 2010). The Station Modernisation Programme in the 1980s created further reasons for tiles to be removed, replaced or relocated (Bailey 1993a, 5; Bailey 1993b, 5; Croome 1998, 74; Horne 2007, 129). The findings here deal mainly with the more recent modernization programmes enacted through the infracos since 2000.

More than one of the following approaches might be used at one station, and even in one part of a station. In the examples below I have chosen to focus on the treatment of tiles in specific areas of stations that clearly demonstrate a point. Observations without references are my own, made from station visits. Some of the terminology used here is not of the standard type used by conservators; I have used wording here in the way it was used during the interviews I undertook and in London Underground documentation. I have endeavoured to explain each of the terms in the text below.

### *Approach 1: Patch repair*

One of the first approaches to conserving London Underground heritage tiling attempted in the 2000s was a "pure" conservation style approach in keeping with the English Heritage adage of maintaining all viable original material (M. Ashworth, *pers. comm.*, April 2010; H. Bell, *pers. comm.*, July 2010; LUL 2006a, 121; M. Pendleton, *pers. comm.*, July 2010). The approach taken was to keep all original tiles that were viable, repairing these where necessary, and patch repairing around them (M. Ashworth, *pers. comm.*, April 2010; LUL 2006a, 121). "Patch repair" is in fact the removal of individual tiles, and their replacement with replicas (D. McCartney, *pers. comm.*, July 2010). There is no officially agreed measure of viability, but a rule of thumb that has been applied in London Underground tiling projects is that if the surface is 70% in good condition, also undefined, then the tile is repaired rather than removed (H. Bell, *pers. comm.*, July 2010). The archetype example of this procedure is Turnpike Lane, which was patch repaired in 2005 (A. Blundell, *pers. comm.*, June 2010).

Turnpike Lane was opened in September 1932 as part of the northern extension of the Piccadilly Line, designed by Charles Holden (FDKC Architects 1993a). Turnpike Lane station is Grade II listed (LUL 2006a, 105-113), so in order to preserve undamaged original fabric it was decided that the best way forwards was to patch repair an agreed percentage of the tiles (M. Ashworth, *pers. comm.*, April 2010; Dunn 2007; LUL 2006a, 121). This agreed percentage was used to quantify the limit at which it would no longer be

worth replacing tiles one by one, and was set, after much debate, at about 20%-30% within a defined area (M. Ashworth, *pers. comm.*, August 2010). In addition, some of the original tiles were cold resin repaired (Dunn 2007). Cold resin repair is a method of infilling small chips in tiles, usually with pigmented polyester or epoxy resin mixed with an activator for quick setting at room temperature in variable humidity (Buys & Oakley 1993, 124; Durbin 2005, 131-132; J. Southern, *pers. comm.*, June 2010). Individual unviable tiles were removed using a diamond edged cutting blade in a process described by Lesley Durbin (2005, 135), and newly made replacement tiles inserted into the spaces left (D. McCartney, *pers. comm.*, July 2010).

The final result of this work was viewed negatively from all sides (M. Ashworth, *pers. comm.*, April 2010; A. Blundell, *pers. comm.*, June 2010; Dunn 2007; LUL 2006a, 121). The visual impact was unappealing, with clean, bright areas adjacent to what appeared in comparison to be dirty uncared for areas (Figure 2). Three different tile finishes – original, resin repaired and replacement, led to what an English Heritage publication has referred to as "a visually discordant patchwork" with an "inconsistent palette of colours and tones" (Dunn 2007). In addition, the process was time consuming and labour intensive and thus expensive (M. Ashworth, *pers. comm.*, April 2010; D. McCartney, *pers. comm.*, July 2010), making it impractical for roll out over many stations.

In buildings conservation, the large scale of the work means that it is often not economically possible to conserve individual elements, and the desire for a professional and clean appearance (LUL 2006a, 2-4) can sometimes only be met by a wholesale replacement of decorative architectural elements. London Underground assert the intention of the architect which, according to them, was for Holden "to produce a clean, crisp aesthetic" (LUL 2006a, 70), a result that has proved to be difficult to achieve with patch repair or resin repair. It is now thought

**Fig. 2:** Patch repair at Turnpike Lane around concourse entrance to platform. Note new bright yellow tiles on the entrance surround (author's photo).

that the station's representation should be considered as a whole (Dunn 2007; LUL 2006a, 121-122); using a holistic approach allows the tiling to be considered within its surroundings, as an aspect of the building, rather than – as at Turnpike Lane - as a collection of individually treatable objects.

### *Approach 2: Patch repair in sections*

Following the Turnpike Lane experience, there was a re-consideration of possible conservation/restoration approaches that could be used network-wide (M. Ashworth, *pers. comm.*, April 2010; LUL 2006a, 121). All parties were interested in options that might have a more positive outcome whilst still aiming to retain original material (LUL 2006a, 121). To this end, London Underground and English Heritage agreed a general policy to deal with the "Poole" type of tiling found in many Holden stations (Lawrence 2008, 49), "to replace panels within defined boundaries – such as inset borders or returns of walls" (LUL 2006a, 122).

This policy is designed to take into account the overall finish and feel of the station (LUL 2006a, 121), thought to be neglected in the previous "patch repair" approach. It also allows some original material to be preserved, within pre-determined areas, which can be easily described and then identified by contractors working in the station, hopefully thus avoiding any collateral damage


**Fig. 3:** Original area of tiling at Bethnal Green, bounded by black strip on the left and ending 4 tiles after the arrow on the right (author's photo).

from other works taking place.

The policy of keeping old tiles in sections that are in good condition and replacing other sections, avoiding "tidemarks" (LUL 2006b, 11), has been applied to several stations. The result has been that some stations have retained a lot of original material, whilst some have been stripped of a great deal.

Bethnal Green, a Holden-style station, opened in 1946 on the Central Line eastern extension that had been put on hold by the Second World War (Bruce & Croome 2006, 48; Davis & Bayne Architects 1993, 5). The tiles used for the platforms were of the "Poole" type also used for the northern Piccadilly Line extension that included Turnpike Lane. The platforms were retiled using replica tiles at the end of 2006 (A. Blundell, *pers. comm.*, June 2010), leaving six original panels, three on each platform. The result is a clean and consistent finish; the difference between the old and new sections is only clear if it is purposefully sought out (Figure 3).

This section-by-section version of patch repair is significantly simpler than the Turnpike Lane approach. Entire sections can be identified for removal, which doesn't require the painstaking identification and removal of individual tiles over a large wall surface. However, these sections do still need to be stripped back, so that the new tiles will sit flush with the original tiles, which is a time consuming job. There must be in every case a significant loss of viable original tiling. Although small examples may be kept by the London Transport Museum, it is not their policy to attempt to gather examples of all types of tile, and the examples they do keep have often come to them in a random manner, through the enterprise of individuals (R. Excell, *pers. comm.*, June 2010).

Although much original tiling is lost, some is retained in the preserved panels, and so this approach can be considered to be conserving the tiles to some extent. By acting decisively to keep original sections, London Underground in collaboration with the contractors have saved these areas and set the precedent to keep them in the future, hopefully guarding against further loss. Stations that have been treated using this approach have been judged to have achieved successful outcomes, in that the replacement tiling has been kept true in colour and design, and the finish is attractive, with no obvious step change between the new and old tiling (M. Ashworth, *pers. comm.*, June 2010; D. Rose, *pers. comm.*, June 2010).

### *Approach 3: Strip and replace*

This approach, which has been used on many stations, involves removing all original tiling, and retiling with replica tiles, in some cases to the design of the original station (as far as can be ascertained (Rose 2007, 45)), and in others to a simplified design that imitates the original in some way (LUL 2006a, 123). Of course, this approach cannot be said to be conserving the original tiles, but in those cases where the original design is kept it can be argued that the design is conserved, and thus the original intention of the architect is respected. Where the replacement tiling is a pastiche of the original (Rose 2007, 130-131, 136-137) it is more difficult to make a conservation case, but the consistency of platform tiling design is conserved, especially within a "family" of stations (LUL 2006a, 123).

Southgate is one example of a station whose platform tiling was stripped and retiled, with original features faithfully replicated. The station opened in 1932 as part of the extension of the Piccadilly Line from Finsbury Park to Cockfosters, and was designed by Charles Holden (FDKC Architects 1993b, 5). The final result of the retiling was very successful, the station appearing bright, clean and attractive, as London Underground claim was Holden's intention (M. Ashworth *pers. comm.*, August 2010; LUL 2006a, 121). Since the retiling, Southgate has been upgraded from a statutory listed status of Grade II to Grade II* (M. Ashworth *pers. comm.*, August 2010), suggesting that English Heritage considers it more desirable from a heritage standpoint to reinstate the architect's intentions than to retain original degraded tiles.

In other cases, stations whose tiling patterns were well known have been stripped and retiled in a totally non-original design (D. Rose, *pers. comm.*, June 2010). Figure 4 shows the original design and retiled pattern at Mornington Crescent, a Grade II listed station opened in 1907 whose platform tiling was replaced in the mid-1990s (Bailey 1993c, 7; Rose 2007, 142-143). The only way in which this tiling change can be said to have conserved the originals is in the shape and colours of the tiles.

The benefits of the strip and replace approach are that the finish is completely consistent across the retiled sections, and all the new tiles will age at the same rate. Although the colour match between original and new tiles is still important to retain the "honesty" of the process, the colour does not need to be an exact match to create visual consistency, because all the tiles are being replaced. The retiling can be combined with a re-siting of cables and other infrastructure within the substrate, and failing substrate can be replaced (LUL 2006a, 122), which has health and safety advantages in that it prevents tiles becoming loose and falling, and is likely to prolong the life of the tiles (Durbin 2005, 79). It is a method that is preferable to over-tiling (see below) because at least stripping and replacement retains the dimensions and architectural details of the station (M. Ashworth, *pers. comm.*, April 2010; A. Blundell, *pers. comm.*, June 2010; D. Rose, *pers. comm.*, June 2010).


**Fig. 4.** Above: Section of the original tile scheme at Mornington Crescent (Rose 2007, pull out "The Hampstead Stations"). Below: Retiled platform at Mornington Crescent (author's photo).

### *Approach 4: Over-tiling*

A process that similarly destroys most existing original material is over-tiling. Replicas are applied directly to the existing tiling, with no consideration given to the possibility of recovering the hidden tiles at a later date (M. Ashworth, *pers. comm.*, April 2010); to attempt to do so would, in fact, be extremely difficult given the hardness of the mortar (D. McCartney, *pers. comm.*, July 2010). Over-tiling can only be done where the substrate is in a good condition, and the original tiles still firmly adhered; a failure in the tiling background could lead to loose and falling tiles (BSI 2009, 15, 29-30; D. McCartney, *pers. comm.*, July 2010). As with the strip and replace method, in some cases the original pattern is retained in the new tiling, and in some cases it is disregarded, to a greater or lesser extent.

Figure 5 shows the over-tiling on the platforms at Covent Garden, a Yerkes station that

**Fig. 5.** Over-tiling at Covent Garden (photo courtesy of Douglas Rose, 2008: http://www.dougrose.co.uk/index_tiles.htm [accessed October 2012]).


**Fig. 6.** Above: Section of the original tile scheme at Camden Town (Rose 2007, pull out "The Hampstead Stations"). Below: Retiled platform at Camden Town (author's photo).

opened in 1907, which lies within the Covent Garden conservation area, although it is not itself listed (Bailey 1993d, 5, 7). As can be seen in the picture, the tile pattern has been faithfully copied, but the original tiles were in good condition, so it is has caused disappointment that the retiling was done at all (M. Ashworth, *pers. comm.*, August 2010; D. Rose, *pers. comm.*, June 2010). The work was carried out due to the infraco's contractual obligations to increase the station's ambience score; over-tiling is a great deal cheaper than the other approaches discussed, and Covent Garden station is not listed, so London Underground could not find an argument for keeping the original tiles that the infraco would accept (M. Ashworth, *pers. comm.*, August 2010). However, London Underground did manage to persuade them to use square edged tiles in good colour matches for the over-tiling.

At Camden Town the over-tiling work was carried out in 2001, and does not attempt to replicate the original tile scheme on the platforms (Rose 2007, 140-141). The same colour is used, but, as at Mornington Crescent, the pattern is reduced to a double line (Figure 6).

Over-tiling has several undesirable outcomes. The boundaries of over-tiled sections are clearly visible, although often they are unobtrusive, being at the edge of patterns, or above the natural sight line. By adding a layer of tiles, the dimensions of the station platform are altered by a small but noticeable amount, and if the approach is continued the effect could worsen. More worryingly, architectural details such as cornicing are reduced in definition, or even lost, much as a blanket would dampen the details of anything it covered (M. Ashworth, *pers. comm.*, August 2010; A. Blundell, *pers. comm.*, June 2010; D. Rose, *pers. comm.*, June 2010). The benefits of over-tiling to the infraco are clear. The process is fairly cheap, as none of the original tiles have to be stripped out, and the colour matching does not need to be exact in order to obtain what would commercially be described as a good finish (A. Blundell,

*pers. comm.*, June 2010; D. McCartney, *pers. comm.*, July 2010), although London Underground argues for good colour matching to retain some honesty in the process (M. Ashworth, *pers. comm.*, August 2010).

As with stripping and retiling, the architect's intent and the feel of the station can be said to be conserved in cases where good colour matches have been achieved and the pattern retained. In other cases the majority of the tangible and the intangible heritage has been lost.

## Concluding Remarks

The conservator's concern is with the retention of any surviving original material, the aesthetics of the tile, and reversibility (to a certain extent); the tiling contractor's concern is with a long term and economically viable solution that can be used consistently throughout a network that contains a vast quantity of tiling. The former treats the tile as an object, and the latter treats the tile as a small part of a design scheme.

Only a very few London Underground heritage tiles, those that end up in the London Transport Museum, are 'conserved' in the museum sense of the word. However, most tiles do not make it into the museum, and this cannot be considered to be the main focus of the work that London Underground carries out. The relevancy of museum-style conservation for tiles *in situ* is debateable. The principles used in a museum setting often have no place in a heavily used transport network. Reversibility, for instance, is never practiced, and attempts to achieve this might in fact lead to breaches of health and safety regulations. Minimum intervention might be said to have been practiced at Turnpike Lane, but not thereafter. The conservation aim of being able to identify new additions amongst the originals (AIC 1997) may in some cases be achieved, but these instances are accidental; the ideal situation for London Underground is to present a consistent finish without "tidemarks" (LUL 2006b,11), blending old and new seamlessly together (LUL 2006a, 159). At some stations originals and replacements are distinguishable only to the very practiced eye. Some conservation principles have, however, been fully considered by the London Underground: authenticity, consideration of overall context, and the importance of material from all historical periods.

In line with this holistic definition of conservation, conservation officers and London Underground prefer to strip and retile a station if the tiles are too damaged to be retained, as this is felt to be more "honest" or authentic to the original design, and keeps the architectural details and spaces intact (M. Ashworth, *pers. comm.*, August 2010). The majority of recent work has aimed at the conservation of the heritage tile patterns and colours, even if the exact layout of the tile scheme is altered to incorporate modern requirements. Treating individual tiles as important historical objects in their own right is impractical and leads to expensive and unattractive patch repair solutions, as at Turnpike Lane, that cannot be considered to be a conservation success. Therefore an approach that combines practically achievable results with the retention of original design, and utilises good replica tiles that closely imitate colour, style and shape, must be the most preferable one. Ideally, in areas where little or no damage had occurred, original tiling can be preserved, as has occurred at Bethnal Green.

However, as stated by one London Underground senior manager, "one man's patina is another man's dirt", and complaints about "scruffy" tiles from customers are still received, even after re-tiling (M. Ashworth, *pers. comm.*, August 2010). Some customers expect "modernisations" to result in stations that resemble Canary Wharf, rather than a version of what was there before; there is still some way to go when it comes to educating the public about the wonderfully accessible heritage in their London Underground.

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After gaining an MA in Principles of Conservation, Kate Fulcher graduated with an MSc in Conservation for Archaeology and Museums from UCL's Institute of Archaeology in Sept 2012 and is currently volunteering in the conservation department of the Ashmolean Museum in Oxford.

***Abbreviations used in the text***

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| BSI | British Standards Institute |
| FDKC Architects | Fry Drew Knight Creamer Architects |
| ICCROM | International Centre for the Study of the Preservation and Restoration of Cultural Property |
| ICOMOS | International Council on Monuments and Sites |
| LTM | London Transport Museum |
| LUL | London Underground Ltd |
| TfL | Transport for London |

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